CITY OF HELENA BUILDING DIVISION * 316 N. PARK * HELENA, MT * 406-447-8438

CITY OF HELENA BUILDING DIVISION

"BITS"

Miscellaneous "BITS" of information that may be of interest to the
City of Helena Contractors and Design Professionals
March 2011

Building Envelope Tightness and Insulation Testing Options

in accordance with
2009 International Energy Conservation Code, Section 402.4.2

IECC, Section 402.4.2 Air sealing and insulation.
Building envelope air tightness and insulation installation shall be demonstrated to comply with one of the following options given by Section 402.4.2.1 or 402.4.2.2.

The provisions of this section are intended to reduce the energy lost to infiltrations and to improve insulation installation. In principle, there are not infiltrations leaks. "The building thermal envelope shall be durably sealed to limit infiltration" (Section 402.4.1). All joints, seams and penetrations and any other sources of infiltration are to be sealed with an air barrier material.

The Administrative Rules of Montana (ARM) defines *"Air Barrier" as – Materials(s) assembled and joined together to provide a barrier to air leakage through and into the building envelope. An air barrier may be a single material or a combination of materials.*

The attached 2-sided page will describe the 2 options available and provide a form to complete to ensure compliance with the requirements of Section 402.4.2.1 or 402.4.2.2.
The project's general contractor shall indicate which option will be utilized at time of permitting and shall have the appropriate form completed and on-site for the City inspector upon completion of that phase of the project.

Section 402.4.2.1 - Blower Door Test Option (Montana Amended)
This option allows compliance when a blower door test measurement of building air tightness results show four(4) air changes per hour or less when tested at 50 Pascal – 4ACH50. A blower door test is performed using a large fan assembly placed in an exterior door opening. The fan draws air out of the building while measuring the air flow required to hold a slight vacuum in the building.

Section 402.4.2.2 – Visual Inspection Option
This option requires that the measures listed in the 2009 IECC Table 402.4.2 are field verified. Where required by the code official, an approved party independent of the installer shall inspect the air barrier and insulation.

As described in the Montana Department of Environmental Quality's - Residential Buildings Energy Code Summary 2011, Figure 4, there are several locations which require air sealing to meet the prescriptive path for a structure required by Section 402.4.2. This document may be found at http://deq.mt.gov/Energy/conservation/homes/NewHomes/BuildingCodes.mcpx listed as Montana Residential Building Energy Code.

BLOWER DOOR TEST OPTION

PROJECT ADDRESS: _____ **DATE:** _____

GENERAL CONTRACTOR: _____

TESTING SUBCONTRACTOR: _____

IECC, Section 402.4.2.1 (Montana amended) Testing option.
Building envelope tightness and insulation installation shall be considered acceptable when tested air leakage is less than four air changes per hour (ACH) when tested with a blower door at a pressure of 1 psf (50 Pa). Testing shall occur after rough in and after installation of penetrations of the building envelope, including penetrations for utilities, plumbing, electrical, ventilation and combustion appliances.
During testing:

1. *Exterior windows and doors, fireplace and stove doors shall be closed, but not sealed;*
2. *Dampers shall be closed, but not sealed, including exhaust, intake, makeup air, backdraft and flue dampers;*
3. *Interior doors shall be open;*
4. *Exterior openings for continuous ventilation systems and heat recovery ventilators shall be closed and sealed;*
5. *Heating and cooling system(s) shall be turned off;*
6. *HVAC ducts shall not be sealed; and*
7. *Supply and return registers shall not be sealed.*

Complete the information on the following tables or provide an approved form containing similar information to indicate compliance.

See Attached Document(s): _____

Building and Test Conditions:

Date:	Time:	
Indoor Temperature:	Outdoor Temperature:	Humidity:
Volume (ft^3):	Floor Area (ft^2):	
No. Bedrooms:	No. Occupants:	
Other:		

Building Envelope Leakage Test:
Requirement: Maximum 4ACH50 (maximum of 4 air changes per hour at 50 Pascals (1psf).

CFM50 = the measured airflow in cubic feet per minute (cfm) at 50 Pascals for the building. *ACH50 = the air changes per hour (ach) at 50 Pascals. ACH50 = (CFM50 x 60) / building volume in cubic feet (* ft^3*)*		
1 - Initial CFM50 reading:	2 - Second CFM50 reading: (optional)	
ACH50 Calculations	Result	$\leq$ 4ACH50 (yes or no)
1 -	ACH50 =	
2 -	ACH50 =	

Where ACH50 = < 1.5 ensure combustion and solid-fuel burning appliances are provided with adequate combustion and ventilation air in accordance with manufacturers' installation instructions and applicable codes.

IECC, Section 402.4.2.2 Visual inspection option.
Building envelope tightness and insulation installation shall be considered acceptable when the items listed in Table 402.4.2, applicable to the method of construction, are field verified. Where required by the code official, an approved party independent from the installer of the insulation shall inspect the air barrier and insulation.

AIR BARRIER & INSULATION CHECKLIST

Component	Criteria	Done
Floors (including above-garage and cantilevered floors)		
General	Insulation is installed to maintain permanent contact with underside of subfloor decking.	
	Air barrier is installed at any exposed edge of insulation.	
Rim joist	Rim joists are insulated.	
	Rim joists include an air barrier.	
Walls		
General	Corners and headers are insulated.	
	Junction of foundation and sill plate is sealed with air barrier material.	
Above grade & below grade, including knee walls	Insulation installed at above grade and below grade walls.	
	Air barrier installed at all above grade walls.	
	Insulation and air barrier installed at all knee walls.	
Crawlspace walls	Insulation is permanently attached to walls.	
	Exposed earth in unvented crawl spaces is covered with Class I vapor retarder with overlapping joints sealed.	
Windows & Doors	Space between window/door jambs and framing is sealed.	
Garage separation	Air sealing is provided between the garage and conditioned spaces.	
Plumbing & wiring	Insulation between outside wall & pipes. Batt insulation cut to fit around, or sprayed/blown insulation extends behind wiring & plumbing.	
Shower/tub on exterior wall	Showers and tubs on exterior walls have insulation behind them.	
	Shower and tubs on exterior walls have an air barrier separating it from the exterior wall.	
Utility boxes on exterior walls	Air barrier extends behind boxes or air sealed-type boxes installed.	
Common walls	Air barrier is installed in common walls between dwelling units.	
Fireplaces	Fireplace walls include an air barrier.	
Ceiling/Attic		
General	Air barrier in any dropped ceiling/soffit is substantially aligned with insulation and any gaps are sealed.	
	Attic access (except unvented attics), knee wall door, or drop down stair is insulated and sealed.	
Recessed fixtures	Fixtures penetrating the thermal envelope are air tight, IC rated and sealed to drywall.	
All Other		
Air barrier & thermal barrier	Exterior thermal envelope insulation for framed assemblies is installed in substantial contact and continuous alignment with building envelope air barrier	
	Breaks or joints in air barrier are filled or repaired.	
	Air-permeable insulation is not used as a sealing material.	
	Air-permeable insulation is located inside of an air barrier.	
Narrow cavities	Batts in narrow cavities are cut to fit, or narrow cavities are filled by sprayed/blown insulation.	
Shafts, penetrations	Duct shafts, utility penetrations, knee walls and flue shafts opening to exterior or unconditioned spaces are sealed.	
HVAC register boots	Register boots that penetrate building envelope are sealed to subfloor or drywall.	

Installation of the above elements has been field verified. Verifier shall be building code official or an approved party independent from the installer of insulation and air barrier.

VERIFIER:_____ DATE:_____

VERIFIER:_____ DATE:_____